

Anthropological Analysis of Trauma Frequencies and Distribution in the Skeletal Series from the Benedictine Monastery of St Margaret in Bijela, Croatia

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ABSTRACT

Trauma analysis was performed on skeletal material from the Benedictine Monastery of St Margaret in Bijela, Croatia. The material consists of 26 skeletons (19 males, three females and four subadults) recovered from six archaeological excavation campaigns. A high number of traumas, particularly perimortem injuries were recorded in the sample. A total of 56 traumas in 17 adults are recorded, 35 of which are perimortem. Based on this, as well as on the presence of ante-mortem sharp edged wounds and the predominance of craniofacial injuries it is suggested that the population buried in the monastic church was subject to high levels of intentional violence. The results are compared to two other monastic cemeteries from the same geographical and historical context, as well as two sites with high frequencies of perimortem trauma. A possible explanation for interring victims of homicide inside the monastery church is discussed in the paper.

Key words: trauma analysis, perimortem trauma, Benedictine monastery, intentional violence, paleopathology, Croatia

Introduction

Trauma analyses are recognized as an important part of the discipline of paleopathology. These analyses provide not only identification and description of traumas but also allow interpretation of social, cultural, or environmental causes of traumatic injuries as well as providing data on their relationship to sex, age, social or cultural systems, and temporal and geographical variation¹.

Traumatic injuries such as fractures, projectile injuries and puncture wounds are a reliable skeletal marker for the study of conflict in archaeological populations particularly as unlike other frequently studied skeletal or dental changes they are not caused by factors such as nutrition, hygiene, parasitic or bacterial infestation, although all of these factors may affect the healing of fractures^{2–5}. Trauma result from interpersonal violence such as warfare or from accidents suffered during everyday activities. The sex distribution of trauma, and their location in the skeleton, can provide insight into their cause. Interpersonal violence is characterized by the presence of perimortem fractures and high frequencies of male trauma to the cranium and face. Traumas that result from

accidents are more often non-lethal injuries to the appendicular skeleton.

In this paper a relatively small osteological sample from a monastic church located in the north-east of Croatia is analysed. The sample is dated to the Late Medieval and Early Modern period. Historical sources describe this period as volatile, unstable and under constant threat from Ottoman Turkish raids⁶. The purpose of this study is to analyze trauma frequencies and distributions to better understand processes that occurred during this period in a monastic setting in Slavonia.

Material and Methods

The Benedictine monastery of St Margaret is situated in Bijela near Daruvar in north-eastern Croatia. The monastery was first mentioned in 1234 AD. During the 14th and 15th century it was one of the most important Benedictine centres in Medieval Slavonia, although at the turn of the 15th century it was used as a fortification⁷. It is

thought that the monastery and its church were abandoned after the Ottoman conquest in the mid-16th century, but some of the excavated graves inside the church date to the 17th century indicating a continued tradition of burials. Radiocarbon dating on 12 skeletons was conducted in 14CHRONO Centre, Queens University Belfast. With the exception of individual no. 3 from the tomb who dates to the 13th and 14th centuries, the rest was dated between the 15th and the end of the 17th century.

In six systematic archaeological excavation campaigns conducted from 2012 to 2017 a part of the single – nave monastery church was uncovered revealing numerous architectural elements, some small finds, and 16 graves⁸. The recovered skeletal material was carefully collected in individually labelled paper bags, transported to the Laboratory of the Anthropological centre of the Croatian Academy of Sciences and Arts, and carefully cleaned with soft brushes under a weak flow of water, so as not to damage the bone. The analysed remains were aged and sexed according to the following criteria. Sex was determined based on criteria in Buikstra and Ubelaker⁹. When pelvic and cranial remains were missing or poorly preserved discriminant functions for the femur¹⁰ and tibia¹¹ developed for antique and medieval Croatian populations were employed to sex the remains. No attempt was made to estimate the sex of subadult individuals.

Trauma analysis was carried out on crania, the post-cranial skeleton, as well as on flat and irregular bones in cases where more than 75% of the bone was present. Fractures were diagnosed macroscopically based on the presence of callus formation, angular deformity, diaphysis asymmetry, or depressions in the skull vault. All bones were also analyzed for the presence of trauma caused by sharp-edged instruments such as swords or axes, penetrating wounds caused by pointed weapons such as spears and daggers, and projectile injuries. These were recognized by linear lesions with well defined sharp edges, “V” shaped in cross section with flat, smooth and polished cut surfaces¹. Traumas were identified by the criteria established by Sauer¹²: antemortem traumas occurred earlier in the individual's life and were identified by healing and remodelling around the wound while perimortem traumas occurred at or near the time of death and were distinguished by lack of healing and formation of new bone. Differences in the frequencies of traumas between the sexes and compared samples were tested with the χ^2 test employing Yates correction when appropriate.

Results

Anthropological analysis was carried out on 26 skeletons recovered from 16 graves (that yielded 20 skeletons), and from outside grave units (yielding 6 skeletons). The final sample consisting of 19 males (73.1%), three females (11.5%) and four subadults (15.4%) shows an obvious underrepresentation of females and subadults.

A total of 56 traumas were recorded on 17 adults, 21 of which were antemortem, while 35 were perimortem. The

highest trauma frequency was recorded on long bones (41.1% or 23/56), followed by fractures on flat and irregular bones (vertebrae, ribs, scapulae, and bones of the hands and feet (33.9% or 19/56), and the least number of traumas were noted on the skull (25.0% or 14/56).

A total of 14 cranial traumas were observed on nine of 19 well preserved skulls. When counted per bone element, most traumas were present on the frontal (4/16 or 25.0%) and left parietal bone (3/18 or 16.7%) (Table 1). In total, four traumas were antemortem while ten perimortem.

TABLE 1
FREQUENCY AND DISTRIBUTION OF CRANIAL TRAUMA PER BONE ELEMENT

Cranial element	N	n	%	AM	PM
Frontal	16	4	25.0	1	3
Left parietal	18	3	16.7	2	1
Right parietal	15	2	13.3	1	1
Occipital	16	0	0.0	0	0
Left temporal	14	1	7.1	0	1
Right temporal	15	1	6.7	0	1
Face	13	1	7.7	0	1
Mandible	18	2	11.1	0	2
Total		14		4	10

N – number of analysed bones, n – number of traumas, AM – antemortem trauma, PM – perimortem trauma

Traumas were also recorded on 23 of 239 preserved long bones (9.6%) 14 of which were perimortem, and nine antemortem. When analyzed by bone element, most of traumas were recorded on the humerii (6/38 or 15.8%), followed by the clavicles (4/33 or 12.1%) and radii (4/35 or 11.4%). Nineteen fractures were noted on flat and irregular bones (vertebrae, ribs, scapulae, and bones of the hands and feet). Eleven of them were perimortem and most of these (7) were recorded on the bones of the left hand.

At the level of individual skeletons four males and two females exhibit perimortem traumas, all of which were inflicted with sharp-edged weapons such as swords, sabres and knives. Additionally, antemortem healed sharp force traumas were recorded in three males.

It is worth mentioning that almost half of all individuals exhibiting traumas (8/17) had more than one trauma present on the skeleton. The male individual from grave 1 (SU 146) clearly stands out with 15 perimortem traumas. Five of these were recorded on the cranium (one on the left parietal bone (Figure 1), one on each temporal bones, and two traumas on the mandible), one trauma is located on the first cervical vertebrae, one on the right scapula and clavicle (Figure 2) while seven traumas are located on the bones of the left hand (one metacarpal and five phalanges) (Figure 3).

Perimortem traumas were also recorded on the crania of two females. One female had a single trauma to the nasal bone while the other exhibited two traumas (one on the frontal bone, and the other on the right parietal bone).



Fig. 1. Male skeleton aged between 30 and 35 years at the time at death from grave 1 (SU 146). Perimortem trauma on the right parietal bone.



Fig. 2. Male skeleton aged between 30 and 35 years at the time at death from grave 1 (SU 146). Perimortem trauma on the right clavicle.



Fig. 3. Male skeleton aged between 30 and 35 years at the time at death from grave 1 (SU 146). Seven perimortem traumas on the left hand.

Apart from traumas recorded in adults, a subadult (SU 240) exhibits an antemortem injury to the left part of the frontal bone. The injury penetrated the inner table of the skull but the rounded and partially healed margins of the wound together with the presence of active periostitis suggest that, at least for some time, this individual survived the wound.

TABLE 2

FREQUENCY AND DISTRIBUTION OF LONG BONE TRAUMA PER BONE ELEMENT

Long bones	N	n	%	AM	PM
Clavicle	33	4	12.1	3	1
Humerus	38	6	15.8	0	6
Radius	35	4	11.4	3	1
Ulna	36	3	8.3	1	2
Femur	36	4	11.1	1	3
Tibia	34	1	2.9	0	1
Fibula	27	1	3.7	1	0
Total	239	23	9.6	9	14

N – number of analysed bones, n – number of traumas, AM – antemortem trauma, PM – perimortem trauma

Discussion and Conclusion

The high frequency of perimortem traumas in the Bijela sample is unusual for a monastery. A previous study¹³ compared the frequencies of pathological conditions (indicators of subadult stress, dental pathologies, and indicators of physical stress) in the Bijela sample to those in two temporally and geographically similar monasteries from Slavonia. The higher frequencies of these skeletal indicators of stress in Bijela may suggest that besides members of the convent lay people were also buried in the church of St Margaret. This may explain the high frequencies of trauma in Bijela that are significantly higher than those recorded in other monastery settings. To put trauma frequencies into context the results from Bijela are compared with those from temporally and geographically similar sites Rudina¹⁴, Streza¹⁵, Udbina¹⁶ and Čepin¹⁷.

The past inhabitants of Bijela exhibit significantly more cranial injuries than those from Rudina ($\chi^2=6.211$; $P=0.01$), while long bone trauma frequencies in Bijela are significantly higher to those recorded in Streza ($\chi^2=36.757$; $P<0.001$). The frequencies of perimortem traumas in Bijela are even higher than those recorded in the Late Medieval and Early Modern period site Udbina – St Jakob that in terms of the distribution of injuries in the skeleton shows the greatest similarity (6/22 or 27.3% compared to 28/267 or 10.5%; $\chi^2=5.517$; $P=0.01$). In the Udbina sample 133 perimortem traumas were recorded in 28 males. Most of these were observed on the cranium and cervical area. Furthermore, eleven of eighteen males were decapitated while three males had perimortem cuts in the mastoid region of the temporal bones suggesting the cutting of ears¹⁶.

Based on the high number of perimortem traumas and their distribution in the skeleton the male from grave 1 closely resembles some Udbina cases. The injuries to the temporal bones could indicate ear cutting while the cut mark on the first cervical vertebrae may be a result of a failed attempt at decapitation. Additionally, the large number of traumas that are located on the posterior side of this individual – the previously mentioned cervical vertebra cut, trauma on the left parietal bone, and trauma on the right scapulae, suggest that this individual was attacked from behind which was also the case with most victims in Udbina. The injuries to his left hand indicate that he defended himself vigorously to the end.

The high frequency of traumas on the upper extremities in males from Bijela supports the theory they were inflicted during some type of an attack, a raid or perhaps an ambush. As most people are right-handed, the blows they inflict are usually directed to the left side of the victim's head who tries to defend him by raising the left hand in front of his head and face which is why forearm injuries are common in these types of scenarios. In combat situations a failed attack or lounge is frequently countered with a counterattack in which the attacker gets hit on his right hand¹⁸. This is why traumas on left and right arms as well as on the hands are considered to be a consequence of both attack and defense.

Because two females and a subadult exhibit perimortem traumas or injuries that were at the time of death still in the process of healing, the sample from Bijela differs from the Udbina series and is in this regard more similar to the one from Čepin¹⁷. Both series exhibit high perimortem trauma frequencies in adults (6/22 or 27.3% in Bijela and 22/147 or 15% in Čepin¹⁷). The Čepin series exhibits a total of 82 perimortem traumas present in 12 males, seven females and three subadults that may have been the victims of a punitive raid carried out Turkish light cavalry known as *akinji*¹⁷. The highest number of traumas in females from Čepin was recorded on the crania which is similar to the scenario noted in the Bijela series. Traumas in females from Čepin were interpreted as mutilations¹⁷ which, because of the small sample, can't be used to explain injuries to females from Bijela.

Interpretation of the results from Bijela also needs to address possible intentional violence towards monks and

their lay servants. Violence directed specifically towards monks and their servants has been recorded in historical sources. There is, for instance, a recorded episode of violence in the Pauline monastery of The Blessed Virgin Mary on Moslavina Mountain. Pisk records two noble families from the 15th century implementing intentional violence towards the monastery that in this case resulted in just material damage. Other physical and verbal abuse, attacks on monks and their subjects (men and women alike) including severe beatings, abductions, death threats and arson have also been recorded. Some injuries resulted in death, especially among the monastery serfs, although monks were also victims¹⁹. Historical sources detailing possible episodes of violence in the Bijela monastery do not, unfortunately exist, so at present it is hard to reconstruct whether violence was directed from within the local community or from an external enemy such as the *akinji*. In any case, as is clear from radiocarbon dating of the skeletons, individuals with perimortem injuries were not victims of a single episode of violence, but rather of temporally different episodes of violence that lasted from the 15th to 17th century. Whether they were buried in Bijela because it was simply a dangerous place to live in and homicide was frequent, or perhaps because of other reasons is not clear. A monastery church in Fishergate in England also exhibits a high frequency of individuals with perimortem injuries²⁰. Analysis of stable isotope values²¹ suggests these individuals were not the "usual clientele" that chose to be buried at Fishergate but were rather brought to the priory when they were injured because this monastery had a tradition of treating combat victims. The Benedictine order was known to care for the sick²² so it is possible that the same practice existed in the monastery in Bijela. After the Benedictine monks left the monastery in the mid-16th century the practice of burying victims of combat in this particular place may have persisted because of tradition.

In conclusion there is no doubt that the high perimortem trauma frequencies, antemortem healed sharp force traumas and predominance of craniofacial injuries in the Bijela series indicates that members of this community were subjected to high levels of intentional violence. While we can't be sure why so many homicide victims were buried in the Bijela monastery, or who these people were, there is hope that future excavations and additional historical research will provide answers to these questions.

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ANTROPOLOŠKA ANALIZA UČESTALOSTI I DISTRIBUCIJE TRAUMA U KOŠTANOM UZORKU IZ BENEDIKTINSKOG SAMOSTANA SV. MARGARETE U BIJELI, HRVATSKA

SAŽETAK

Analiza trauma je provedena na koštanom materijalu iz benediktinskog samostana sv. Margarete u Bijeli, Hrvatska. Materijal potječe iz šest arheoloških kampanja i sastoji se od 26 kostura (19 muškaraca, tri žene i četvero djece). U analiziranom uzorku je zabilježena visoka učestalost trauma, osobito perimortalnih. Na 17 odraslih osoba prisutno je 35 perimortalnih trauma. Na temelju toga, ali i prisutnosti oštrobričnih antemortalnih trauma, kao i visoke učestalosti kranijofacijalnih trauma, sugerira se da je populacija pokopana u Bijeli bila izložena visokoj razini namjernog nasilja. Rezultati su uspoređeni sa još dva samostanska groblja koja potječu iz istog geografskog i povijesnog konteksta te su dva nalazišta u kojima je zabilježena visoka učestalost perimortalnih trauma. Također, u radu su razmotrena moguća objašnjenja zašto su ubijeni ljudi pokopani u samostanskoj crkvi.

